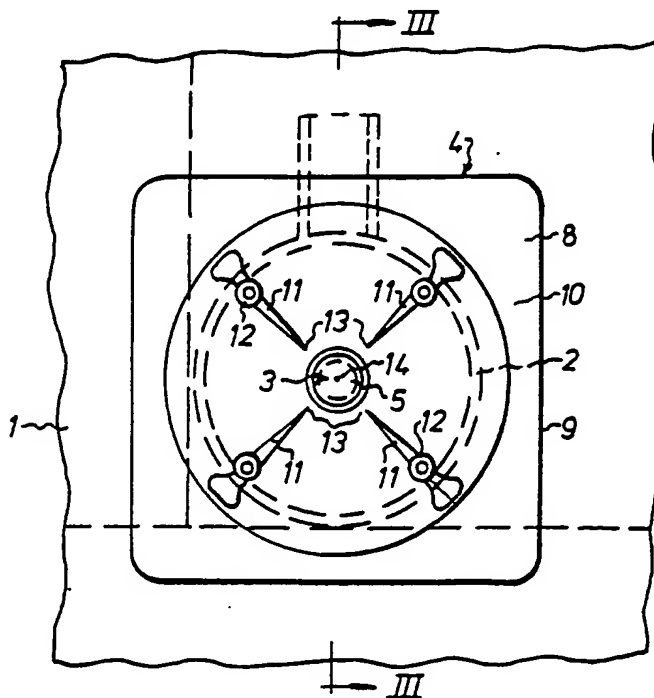




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(54) Title: METHOD AND DEVICE FOR LOCATING CONCEALED JUNCTION BOXES



(57) Abstract

A device for locating junction boxes (2) temporarily concealed behind panels (1) has a magnetic centering member (3) for mounting in the center of the box (2) before the panel is mounted, and a detector (4) with needles (11) which, when the detector is passed over the concealed centering member (3), are attracted by said centering member to point to the center of the box (2), thereby to indicate the position of the hole to be made in the panel (1) in order to expose the box. After the hole has been made, the centering member (3) is removed.

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METHOD AND DEVICE FOR LOCATING
CONCEALED JUNCTION BOXES

The present invention relates to a method and a device for locating junction boxes for electrical fittings and equipment temporarily concealed behind wall and ceiling panels, floor boards or the like.

5 Before interior wall and ceiling panels are mounted, and in some cases also before the laying of floor boards etc., it is often necessary to make holes for the junction boxes required for the electrical fittings and similar equipment.

10 A normal drawing room may have as many as 10 to 15 holes. The hole diameter usually is 75 or 85 mm for boxes having a standard outer diameter of 75 and 83 mm, respectively.

15 The boxes are mounted on nailed wooden studs and are positioned such that they partly project into the panels, but without extending completely there-through. In addition, the boxes are mounted in different places, for example at different levels on a wall, depending upon whether they are to be used for plugs,
20 switches or junctions.

It will thus be obvious that very accurate measurements must be taken before holes are made to expose the boxes.

25 One possibility is to apply marking ink to the boxes for making an impression on the back of the panel. This means that the panel must be removed and that the hole must be made on the back. The impression frequently is smudgy and uneven.

30 Another possibility which, in principle, can be used only for plaster panels, is to provide the box before the panel is mounted with a centering member having a point in its center. When the panel is pressed against the studs, the point will penetrate the panel

and serve as a guide pin for the trepanning tool with which the hole is made. One of the shortcomings of this technique is that the panel may be positioned askew. Nevertheless, the advantages are so many that the workmen mounting the panels often prefer plaster
5 panels to chipboard which is a more solid material.

It is the object of this invention to provide a method and a device which obviate the shortcomings of prior art technique and which give many advantages. All conventional panel materials can be used, and
10 the holes are made quickly and accurately.

This object is achieved in the method according to the invention in that, before the panel is mounted, a centering member of metal, preferably of magnetic or magnetisable material, is positioned in the center
15 of the box, to be concealed behind the mounted panel, and that a metal-sensitive, preferably magnetic field-sensitive detector is passed in front of the mounted panel over the concealed centering member for accurately locating the box center and thus the position of the
20 hole to be made in the panel in order to expose the box.

The device for locating the boxes by this method is characterised by a centering member of metal, preferably of magnetic or magnetisable material, said
25 member being positionable, before the panel is mounted, in the center of the box, to be concealed behind the mounted panel, and by a metal-sensitive, preferably magnetic field-sensitive detector that can be passed in front of the mounted panel over the concealed centering member for accurately locating the box center
30 and thus the position of the hole to be made in the panel in order to expose the box.

The invention will be described in more detail below, reference being had to the accompanying drawings
35 illustrating some embodiments of the method and the device according to the invention, which are especially

preferred at present. Fig. 1 shows the front side of a portion of a wall panel, a box concealed behind the panel, and a detector comprised by the device according to the invention in one of several possible initial positions. Fig. 2 shows, in a projection corresponding to Fig. 1, the detector opposite the concealed box. Fig. 3 is a section along line III-III in Fig. 2. Fig. 4 shows a section corresponding to Fig. 3 after the hole has been made. Figs. 5, 6 and 7 illustrate an alternative embodiment of the detector in cross-section along line VI-VI in Fig. 6, from the front and from the side. Figs. 8 and 9 show another alternative embodiment of the detector from the front and from the side.

The main components of the device, illustrated in the drawings, for locating a junction box 2 temporarily concealed behind a wall panel 1 are a centering member 3 and a detector 4.

The centering member 3 is made of a magnetic or magnetisable material and comprises, in the embodiment illustrated, a round bar magnet 5 disposed in the center of a holder 6. Before the wall panel 1 is mounted, the holder 6 is positioned over the opening 7 of the box 2, with the magnet 5 in the center of the box 2, to be concealed behind the mounted wall panel 1.

The detector 4 is magnetic field-sensitive and comprises, in the embodiment illustrated, a needle-type instrument 8 having a dustproof housing 9 with a transparent lid 10. In the embodiment illustrated, four needles 11 are restrictedly pivotally mounted in the housing 9 by means of rolling bearings 12, preferably ball bearings, the needles 11 being visible through the lid 10. The needle instrument 8 can be moved in front of the mounted wall panel 1 over the concealed magnet 5 (see Fig. 1) for accurately locating the center of the box 2 and thus the position

of the hole in the panel 1 to expose the box 2. More particularly, the points 13 of the needles 11 are attracted by the magnet 5 to point to a common locating point 14 on the housing 9 when the locating point
5 is opposite the magnet 5 and thus the center of the box 2; see Figs. 2 and 3.

After that, the correct location is easily drawn up, or the instrument 8 can be used as a fixture for preboring, in which case the housing 9 of the instru-
10 ment is provided, in the common locating point 14, with a guide bush 15 for a center bit on a trepanning tool 17 for making the hole. To prevent damage to the centering member 3 by the center bit 16 during preboring, the centering member should preferably
15 be made laterally or inwardly movable to enable it to yield when struck by the center bit.

After preboring, the instrument 8 is removed, and a hole is made with the trepanning tool 17, as shown in Fig. 4. After the hole has been made, the
20 box 2 is exposed, thereby giving access to the centering member 3 for removal and reuse.

As mentioned above, the needles 11 are pivotally mounted in the housing 9 on rolling bearings 12, but may alternatively be mounted on slender shafts or
25 needle bearings. Naturally, the needles 11 should also be balanced to eliminate erroneous needle movement due to forces of gravitation. The sensitivity of the needles can be increased if the needles are also magnetised to the correct polarity relative to
30 the magnet 5 of the centering member 3. It is also advisable to accentuate the contrast between the needles 11 and the bottom of the housing 9.

Both the centering member 3 and the holder 6 by which it is carried, should be as flat or low as
35 possible so that they can be used also when the box 2 is wired. Furthermore, the holder 6 and the centering member 3 should be readily removable by hand.

Instead of making the centering member 3 movable laterally or inwardly to enable it to yield when struck by the center bit 16, it is of course also possible to design a special trepanning tool whose center bit
5 has a restricted spring action.

In the embodiment described above and shown in the drawings, the needle instrument 8 has four needles 11. The number of needles may, however, be varied, although the minimum suitable number of needles for
10 sufficient accuracy presumably is two or three. The needles may be replaced by other means, for example Hall elements, which also respond to the magnetic field of the magnet 5. Furthermore, the magnet 5 need not be a round bar magnet, but may also be an annular
15 magnet having a central hole sufficiently wide to permit insertion of the center bit 16 of the trepanning tool 17.

In the alternative embodiment shown in Figs. 5-7, the indicator 4 is in the form of a roller instrument 18 comprising a roller 20 rotatably mounted in
20 a transparent housing 19. The housing is provided on its circumference with a plurality of sighting marks 21 adapted to cooperate with indicating marks 22 on the circumference of the roller 20. A wire 23
25 of magnetic field-sensitive material, such as iron, is embedded in the circumference of the roller 20. The roller instrument 18 is passed over the concealed magnet 5 until the indicating marks 22 coincide with the sighting marks 21, whereupon the panel 1 is marked
30 by means of a pencil or the like through recesses 24 at the ends of the housing 19. The ruler side 25 is used for drawing a line between the marks. The roller instrument 18 is then turned through about 90° and a new measurement is made, whereupon a new
35 marking operation is carried out. The intersection of the drawn lines represents the exact center of the box 2. The main advantage of this alternative

embodiment is that the different sighting and indicating marks 21, 22 facilitate reading of the instrument 18 on the floor and against the ceiling.

5 Figs. 8 and 9 illustrate a further alternative embodiment of the indicator, this time in the form of a level-type instrument 26 having a transparent housing 27 which contains a suitable liquid 28, for example water or a light oil in which a hollow ball 29 of steel or similar magnetic field-sensitive material 10 is suspended. The center of the housing 27 has ring marks 30, and recesses for marking are provided at suitable points on the periphery of the housing 27. The instrument 26 is passed over the magnet 5 concealed behind the panel 1 until the ball 29 responds. The 15 instrument is moved on until the ball 29 is in the center of the ring mark 30, and a pen or the like is used for marking the panel 1 through the recesses 31, whereupon lines are drawn between opposite markings. At the intersection of the lines, the magnet 5 and 15 thus the center of the box 2 is to be found.

Naturally, the invention is not restricted to the embodiment and the variants thereof as described above and shown in the drawings, but may be modified in different ways within the scope of the appended 20 claims.

CLAIMS

1. A method for locating junction boxes for electrical fittings and equipment temporarily concealed behind wall and ceiling panels, floor boards or the like, characterised in that, before
5 the panel is mounted, a centering member of metal, preferably of magnetic or magnetisable material, is positioned in the center of the box, to be concealed behind the mounted panel, and that a metal-sensitive, preferably magnetic field-sensitive detector is passed
10 in front of the mounted panel over the concealed centering member for accurately locating the box center and thus the position of the hole to be made in the panel in order to expose the box.

2. A device for locating junction boxes (2) for electrical fittings and equipment temporarily concealed behind wall and ceiling panels (1), characterised by a centering member (3) of metal, preferably of magnetic or magnetisable material, said member being positionable, before the panel (1) is
15 mounted, in the center of the box (2), to be concealed behind the mounted panel, and by a metal-sensitive, preferably magnetic field-sensitive detector (4) that can be passed in front of the mounted panel (1) over the concealed centering member (3) for accurately
20 locating the box center and thus the position of the hole to be made in the panel (1) in order to expose the box.

3. A device as claimed in claim 2, characterised in that said centering member (3) comprises a magnet (5) mounted in the center of a holder (6) removably positionable over the opening (7) of
30 the box (2).

4. A device as claimed in claim 3, characterised in that the magnet is a round bar magnet

(5), the center axis of which coincides with the center of the box (2).

5 5. A device as claimed in any one of claims 2-4, characterised in that the detector (4) comprises a needle-type instrument (8) having at least one needle (11), the point (13) of which is attractable by said centering member (3) for exact indication of the center of the box (2).

10 6. A device as claimed in claim 5, characterised in that said needle instrument (8) comprises a preferably dustproof housing (9) having a transparent lid (10), and that the needle or needles (11) are pivotally mounted in said housing and visible through said lid (10), the points (13) of said needles pointing to a common locating point (14) on said housing 15 (9) when said locating point is opposite the centering member (3).

20 7. A device as claimed in claim 6, characterised in that said housing (9) is provided in said common locating point (14) with a guide bush (19) for a center bit (16), preferably on a trepanning tool (17) for making the hole.

25 8. A device as claimed in any one of claims 2-7, characterised in that said centering member (3) is movable laterally or inwardly to yield when struck by the center bit (16).

30 9. A device as claimed in claim 6, characterised in that said needle or needles (11) are restrictedly pivotally movable in said housing (9) by means of bearings (12) and balanced to prevent erroneous needle movement under the action of forces of gravitation.

35 10. A device as claimed in any one of claims 5, 6 and 8, characterised in that the needle or needles (11) are magnetised to the correct polarity relative to the magnet (5) of said centering member (3), thereby to increase the needle sensitivity.

Fig.2

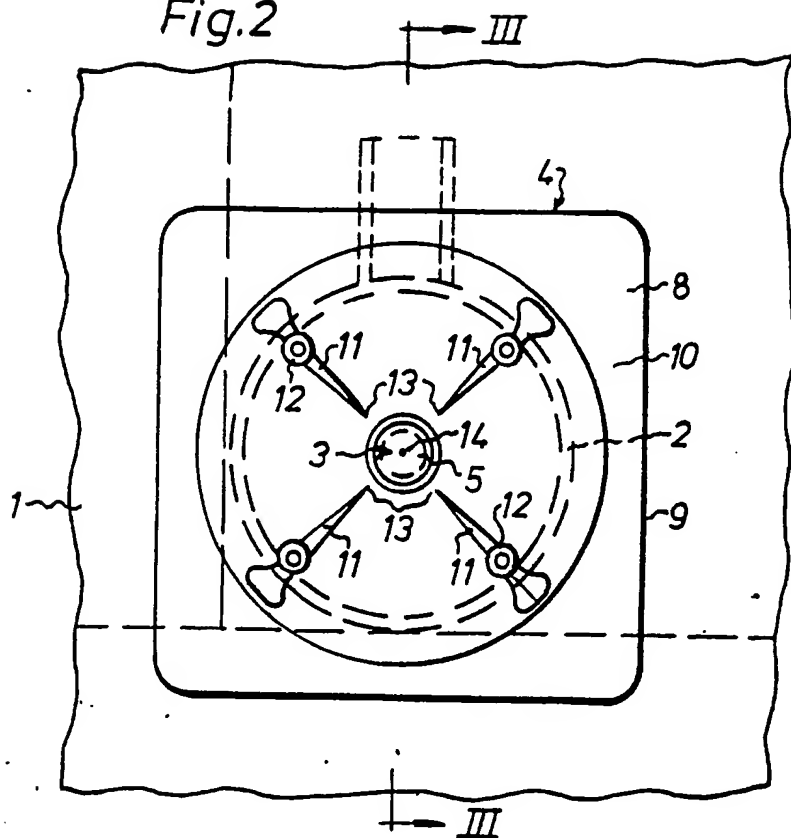
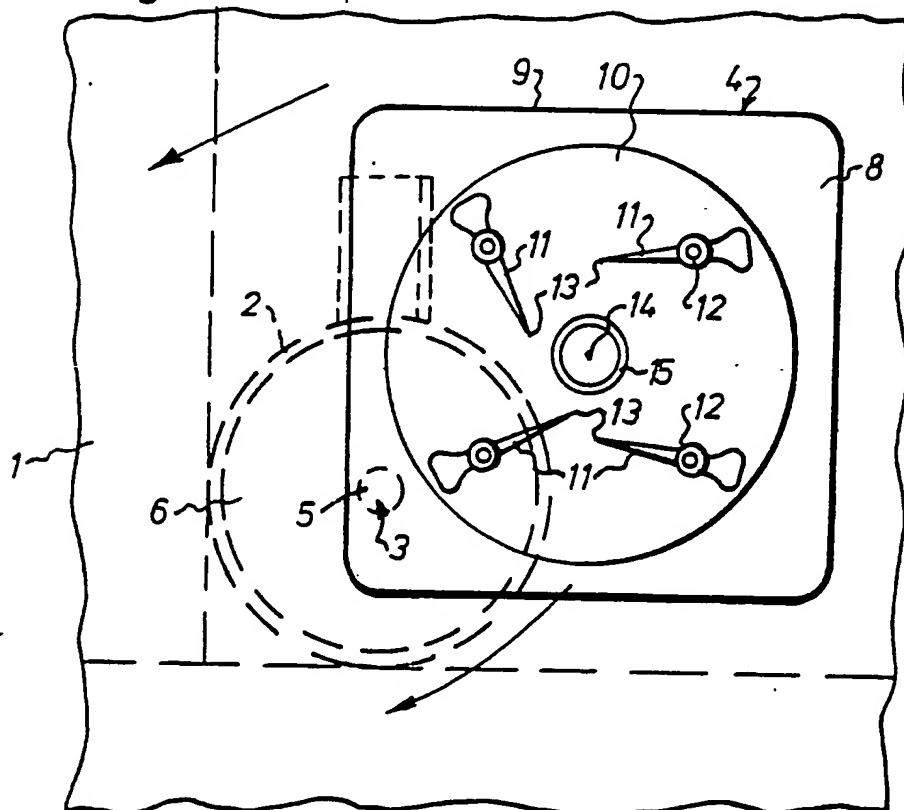
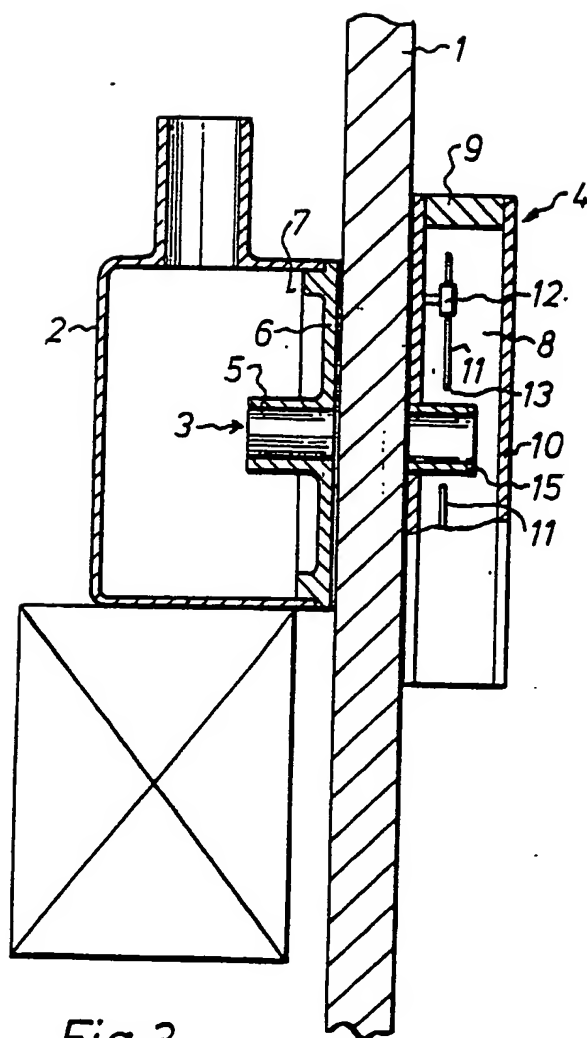


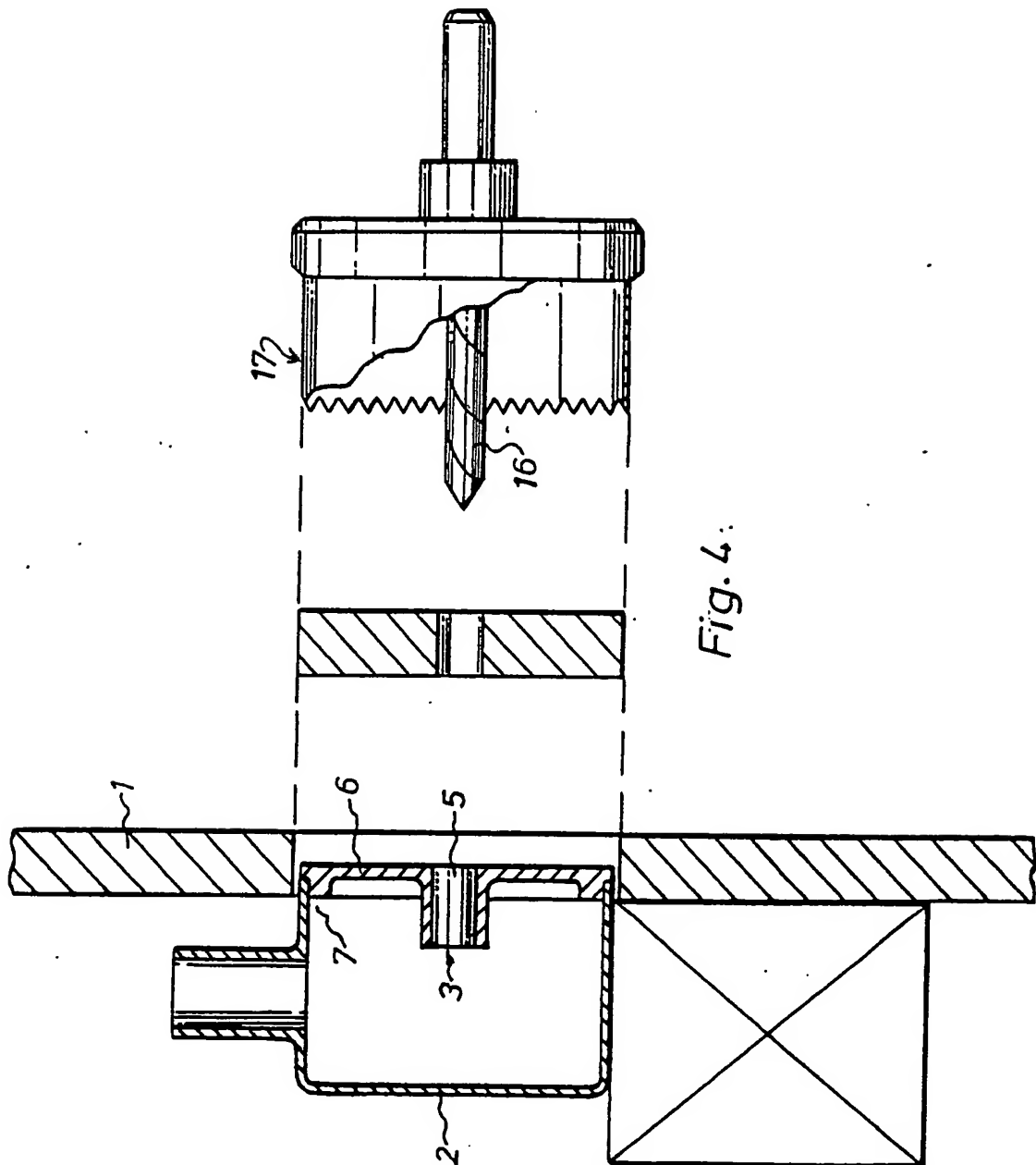
Fig.1



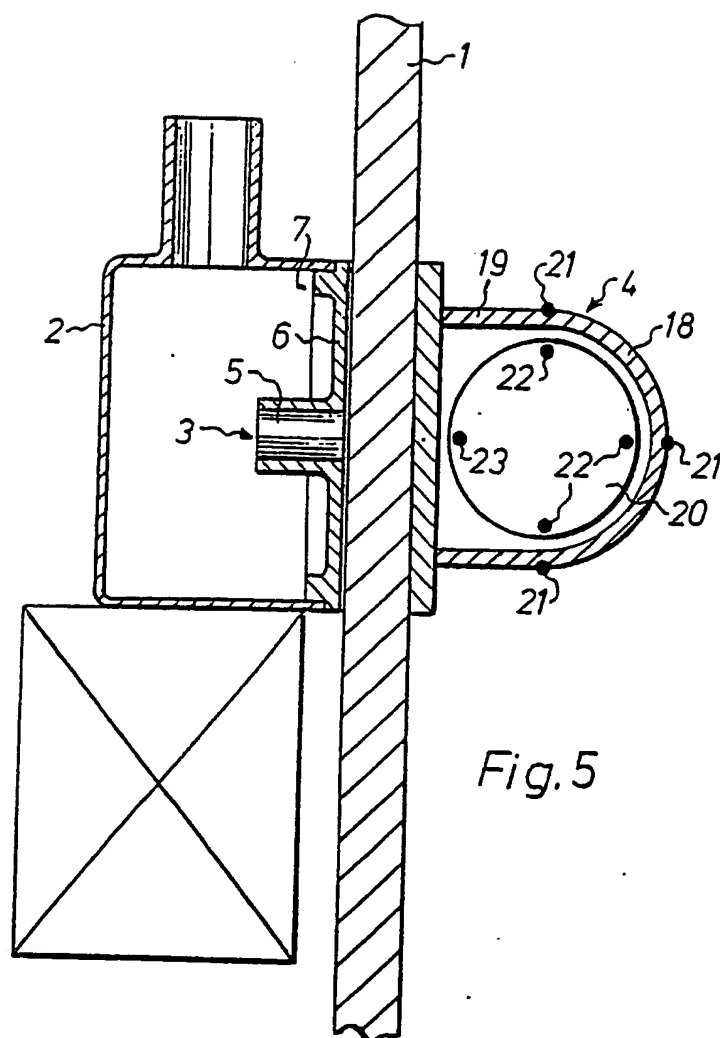
2/6



3/6



4/6



5/6

Fig. 6

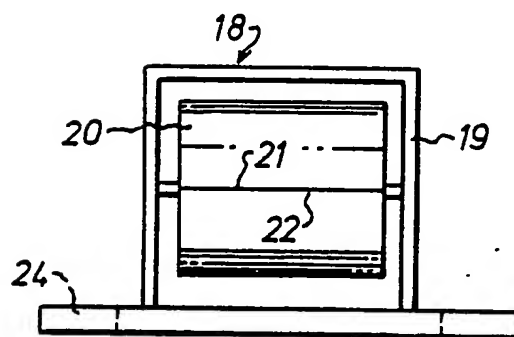
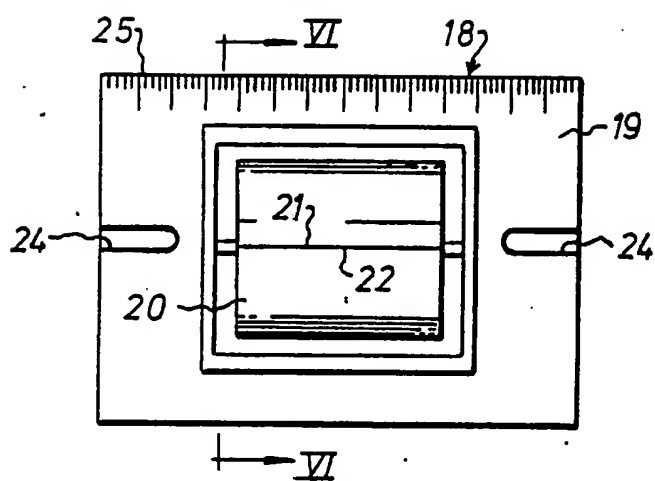


Fig. 7

6/6

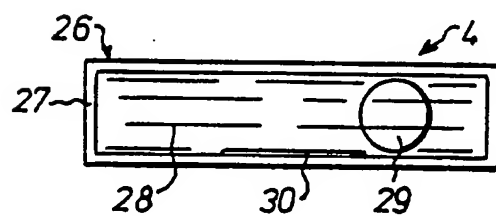
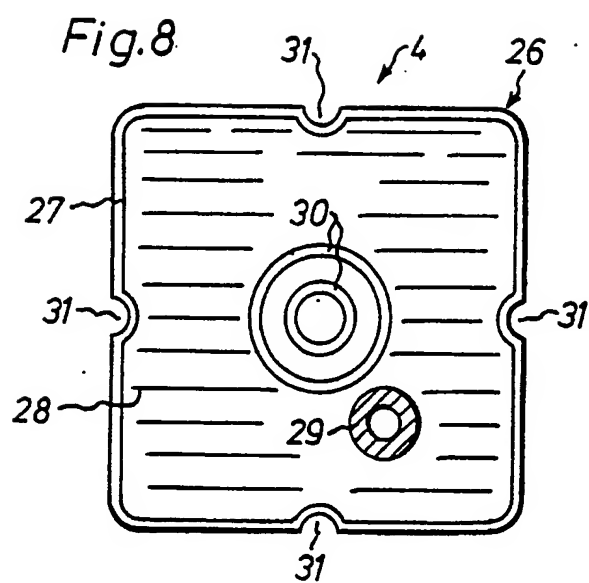
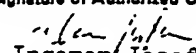
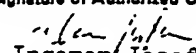
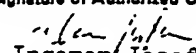


Fig. 9

INTERNATIONAL SEARCH REPORT

International Application No PCT/SE87/00472

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC 4 <div style="text-align: center; padding: 5px;">G 01 N 3/08</div>								
II. FIELDS SEARCHED <div style="text-align: center; padding: 5px;">Minimum Documentation Searched ⁷</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%; padding: 5px;">Classification System</th> <th style="width: 75%; padding: 5px;">Classification Symbols</th> </tr> <tr> <td style="padding: 5px;">IPC 4 US C1</td> <td style="padding: 5px;">G 01 V 3/00, /08-/11 <u>324</u>: 3, 8, 41, 219; <u>340</u>: 258, 282, 568, 686</td> </tr> </table> <div style="text-align: center; padding: 5px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸</div> <div style="text-align: center; padding: 10px;">SE, NO, DK, FI classes as above</div>			Classification System	Classification Symbols	IPC 4 US C1	G 01 V 3/00, /08-/11 <u>324</u> : 3, 8, 41, 219; <u>340</u> : 258, 282, 568, 686		
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III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹ <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; padding: 5px;">Category ⁹</th> <th style="width: 60%; padding: 5px;">Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²</th> <th style="width: 30%; padding: 5px;">Relevant to Claim No. ¹³</th> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 10px;">X</td> <td style="padding: 10px;"> SE, B, 417 018 (B WESTER OCH A WESTER) 16 February 1981 & GB, 2066587 FR, 2472196 JP, 56094286 DE, 3047405 US, 4388890 CA, 1162624 </td> <td style="text-align: center; vertical-align: top; padding: 10px;">1,2,7</td> </tr> </table>			Category ⁹	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	X	SE, B, 417 018 (B WESTER OCH A WESTER) 16 February 1981 & GB, 2066587 FR, 2472196 JP, 56094286 DE, 3047405 US, 4388890 CA, 1162624	1,2,7
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